



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/602,716	06/25/2003	Chandra Mouli	M4065.0904/P904	9955
24998	7590	08/02/2005	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			KANG, DONGHEE	
2101 L Street, NW			ART UNIT	PAPER NUMBER
Washington, DC 20037			2811	

DATE MAILED: 08/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

**Office Action Summary**

Application No.

10/602,716

Applicant(s)

MOULI, CHANDRA

Examiner

Donghee Kang

Art Unit

2811

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 May 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-77 is/are pending in the application.
- 4a) Of the above claim(s) 14-23, 25-29, 42-48, 63-71 and 73-77 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13, 24, 30-41, 49-62 and 72 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims **1, 8-11, 24, 30-32, 39-41, 52, 59-62, & 72** are rejected under 35 U.S.C. 102(e) as being anticipated by Mann et al. (US 6,768,149).

Re claims 1, 30 & 52, Mann et al. teach an image sensor, comprising (Fig.3):

a substrate; an array of pixel cells formed at a surface of the substrate, wherein each pixel cell comprises a transistor formed adjacent to a photo-conversion device (310), transistor comprising a gate (304) and a channel region under the gate, the gate comprising first (312) and second (314) gate regions each having a having a work-function greater than a work-function of N<sup>+</sup>Si, the channel region comprising first and second channel portions under the first and second gate regions, respectively. See also Col.4, line 53-Col.5, line 40.

Re claims 8, 39 & 59, Mann et al. teach at least one gate region comprises a layer of lower doped polysilicon of a first or second conductivity type.

Re claims 9, 40 & 60, Mann et al. teach at least one gate region has a dopant profile allowing for at least partially depletion of the at least one gate region.

Art Unit: 2811

Re claims 10 & 61, Mann et al. teach the dopant is indium.

Re claims 11, 41 & 62, Mann et al. teach there is approximately no active dopant in at least one portion of the channel region.

Re claims 31-32, Mann et al. teach the image sensor is a CMOS image sensor or a charge coupled device image sensor.

Re claims 24 & 72, Mann et al. Teach a pixel cell comprising:

A photo-conversion device; and a transistor formed adjacent to the photo-conversion device, wherein a gate of transistor is a mid-gap material. By the definition, mid-gap materials are those materials having a work-function falling between the work-functions of P+ silicon and N+ silicon (see specification paragraph 0038 on page 9). The lightly doped n and p-type silicon have a work-function between the work-functions of P+ silicon and N+ silicon.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 7, 12-13, 33, 38, 53, & 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mann et al. (US 6,768,149).

Re claims 2, 33 & 53, Mann et al. do not teach the transistor is a transfer transistor. However, it would have been obvious to one of ordinary skill in the art at the

time the invention was made to use the transistor of Mann et al. as a transfer transistor since it is an intended use as matter of obvious design choice.

Re claims 7, 38 & 58, Mann et al. do not teach the gate region comprises P<sup>+</sup> doped polysilicon. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the concentration of the gate electrode, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re claims 12-13, Mann et al. do not explicitly teach a second transistor formed over the substrate. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a plurality of transistors, such as reset, amplify and transfer transistors, in order to operate the image sensor properly.

5. Claims **3-6, 34-37, & 54-57** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mann et al. in view of Ponomarev (Gate-Work-function Engineering Using Poly-(Si,Ge) for High-Performance 0.18  $\mu$ m CMOS Technology, IEDM 1997).

Mann et al. do not teach gate region comprises a mid-gap material including SiGe. Ponomarev et al. teach forming gate electrode using SiGe to control the gate work-function. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the polysilicon gate electrode with a mid-gap material since threshold voltage can be controlled easily without threshold voltage adjustment implantations.

6. Claims **49-51** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mann et al. in view of Boon (US 6,198,087).

Mann et al. do not teach a processor and an image sensor coupled to the processor. It is conventional in the art and also Boon teaches the image sensor coupled to the processor. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to couple the image sensor to the processor in order to operate the system properly.

#### ***Response to Arguments***

7. Applicant's arguments filed 5-25-05 have been fully considered but they are not persuasive.

Applicant argues that Mann fails to disclose "first and second gate regions each having a work-function greater than a work-function of N+ Si". This is not convincing. The lightly doped N-type gate region has a greater work-function than N+ Si.

#### ***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 571-272-1656. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steve Loke can be reached on 571-272-1657. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Donghee Kang  
Primary Examiner  
Art Unit 2811

dhk